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June 30, 1997

RECEIVED

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

The Secretary
Federal Communications Commission
1919 M. Street N.W. Room 222
Washington, DC 20554

In the Matter of	)	ET-Docket No. 93-62
	)	and in this docket pertaining to:
Guidelines for Evaluating the Environmental	)	- Report and Order FCC 96-326
Effects of Radiofrequency Radiation	)	- First Memorandum ofUnderstanding Order FCC 96-487

Ex Parte Comments Pertaining to ET-Docket 93-62 Regarding
PETITIONS FOR RECONSIDERATION of Commission Rule & Order FCC 96-326, and First Memorandum of Opinion and Order FCC 96-487

with original and 2 copies submitted to the Secretary of the Commission in accordance with 47 CFR §1.1202, 1.1203, and 1.1206(a)

2nd Ex Parte Submission

Dear Mr. Secretary,

Enclosed please find an original and 2 copies of an ex parte presentation pertaining to ET-Docket 93-62 and being submitted in accordance with 47 CFR §1.1202, 1.1203, and 1.1206(a). Please assure these are put in the official record of this proceeding.

Thank you

David Fichtenberg

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Before the

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Washington, DC 20554

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To: The Commission

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2nd Ex Parte Submission

Submitted by the Ad-hoc Association of Parties Concerned About the Federal Communications Commission's Radiofrequency Health and Safety Rules
PO Box 7577
Olympia, WA 98507-7577 Tel: (206) 722-8306

Dated June 30,1997

TABLE OF CONTENTS

Summary

Some of the key Ad-Hoc Association requests are shown below, and points in this ex parte submission which support these requests are indicated.

1. RF exposure should be kept as low as reasonably achievable ("ALARA"). Additional adverse effects and biological effects are presented which further justify the ALARA directive. Specific examples concerning worker safety limits are given which show that the 6 minute exposures and shorter times allowed at higher exposures are not sufficiently protective. States and local jurisdictions must be able to decide what is reasonable based on the latest science studies finding adverse effects and the local geographical conditions, for the Commission has not been able to keep its standards up to date, as its 'new' standard is now 10 years old. Since buildings may attenuate little, if any of the signal, the ALARA principle is all the more important.
2. A worker RF health and safety program should exist which mitigates any increase in worker risk. This must include protections for partial body exposure, and shorter time periods over which to average worker exposure. Also, only hand held phone models known to meet present standards should be allowed to irradiate worker's heads.
3. Protections provided by FCC rules, i.e. from body heating, should be stated, and effects (cancer) reported at levels below the FCC hazard threshold should be listed in FCC materials
4. No 'grandfathering' of facilities - all facilities need to meet the new rules when the implementation period for the new standards begin.
5. Out-of-compliance conditions shall be detected, especially when tall transmitters are close to nearby multi-story buildings resulting in out-of-compliance exposures at upper floor levels.
6. Reduce environmental exposures to 40% of present values associated with given internal rates of absorption of RF energy - based on a computer method found valid by the FCC.
7. Reduce the FCC hazard threshold to no more than 15% of its current value - based upon the accepted RF standard setting criteria of disruption of learned behavior and scientific papers acceptable for standard setting.

8. Reduce exposure limits to as low as about 1/1000th, or if not to 1/100th, or if not then to 1/20th, or if not then to 1/7th of current limits. These reductions apply to cellular phone exposures, and especially apply to workers. Recent studies especially justify reducing cellular phone exposures. Also consideration of the time workers may be exposed to cellular phones and other wireless phones justifies not allowing their exposure to be higher than the general population - there is no science based reason why the heads of workers should be exposed to 5 times higher levels. Also, the Commission should require reauthorization of hand-held mobile phones, especially for workers who use them more, and since there is evidence that they may exceed exposure limits. These limits are also justified by seeking limits which will avoid fear, which is also a consideration the Commission must consider to meet its National Environmental Policy Act (NEPA) considerations.

The Commission needs to set its limits to be stringent as requested to avoid constitutional challenges based on 'taking' clauses.

9. 'Flat' or constant power density limits are indicated by the science based literature since 'hot spots' and intense skin surface heating occurs at the higher frequencies, demonstrating that whole body average RF absorption is not the only criteria upon which to base power density.

10. Regulations must protect workers from high RF exposures to localized body areas.

11. Studies indicate localized exposure to eyes should be based on a hazard level of 0.2 W/kg, 1/40th of the 8 W/kg now deemed 'safe' for a worker's eyes.

12. The Commission should re-authorize models of hand-held phones as evidence indicates some may not be safe, especially those which can output relatively high power to the heads of workers.

13. When the public or non-RF workers are in transient passage through areas they should not receive RF exposure applicable to workers fully aware and in control of their exposure.

14. Reduce time period for averaging exposure to a few seconds, say 5 seconds.

15. Notify the public and workers to be affected by a transmitter of observed effects and planned exposures.

16. Predict exposures based on worse case environmental conditions, e.g. corner reflections, metallic glass frames acting as passive reflectors, especially for short wave lengths of cellular and personal communications services wavelengths.

17. Local jurisdictions can select parties to serve as independent monitors of exposure.

18. State Commission's preemption authority does not extend to "operation" of personal wireless services facilities nor to bona fide regulations to protect public safety and welfare.

19. The Commission should seek the evaluation of the federal health agencies concerning RF health and safety claims and requests made in this proceeding, since the Commission does not have expertise in this area, but is responsible that its limits be properly protective.

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2nd Ex Parte Submission

Submitted by the Ad-hoc Association of Parties Concerned About the Federal Communications Commission's Radiofrequency Health and Safety Rules, PO Box 7577, Olympia, WA 98507-7577

1. Introduction:

1.1 Appropriate submission of an ex parte presentation

The Ad-hoc Association of Parties Concerned About the Federal Communications Commission's Radiofrequency Health and Safety Rules ("the Ad-Hoc Association") understands (i) that a Federal Communications Commission ("Commission") "Sunshine Agenda" period per 47 CFR §1.1202(f) and §1.1203 is not now in effect regarding ET-Docket 93-62; (ii) that administrative finality has not yet been decided upon concerning the Commission's responses to Petitions For Reconsideration that have been submitted in this proceeding; and that (iii) this proceeding permits ex parte presentations in accordance with 47 CFR §1.1202, 1.1203, and 1.1206(a), 1.1208, and in accordance with the April 8, 1993 Notice of Proposed Rule Making in ET-Docket 93-62, paragraph 30. Accordingly, the Ad-Hoc Association is properly making this ex parte submission.

1.2. Purpose of presentation

Herein the Ad-Hoc Association presents further evidence which (i) supports its requests and its claims in its petition for reconsideration regarding FCC 96-326 and dated September 6, 1991 and its petition for reconsideration regarding FCC96-487 and dated February 21, 1997, (ii) provides examples of how these requests have specific application, (iii) and makes some minor corrections to the Ad-Hoc Association ex parte written presentation dated June 10, 1997 ("Ad-Hoc June 10 submission") and submitted to the Secretary of the Commission in accordance with the same provisions as this submission. To the extent that these comments rely on findings that were not previously presented to the Commission, these facts and reports became available after the last opportunity for filing in this matter, excluding ex parte presentations, and in any event, consideration of these facts and comments significantly relates to changes needed for the public health and is in the public interest. In this way, the Ad-Hoc Association is providing an opportunity for the Commission to review and pass upon the matters presented herein[1], and by so doing the Commission will have the opportunity of considering any newly discovered evidence[1], and the Commission will also thus have the opportunity of reviewing objections not first raised previously[1] and which support the requests in the Ad-Hoc Association FCC 96-326 and FCC 96-487 petitions, and in any event, even if the Commission find otherwise, the Commission's consideration and approval of Ad-Hoc Association requests is in the public interest. Should the Commission find it appropriate to modify other sections of 47 CFR to implement the intent of the Ad-Hoc Association requests, it is requested that it do so, and make any other modifications it finds to be just and proper to serve the public interest.

1.3 Summary of some key Ad-Hoc Association requests in this proceeding and source of request; unless otherwise stated the "Petition" means the Ad-Hoc Association petition for reconsideration of FCC 96-326.

1.3.1. RF exposure should be kept as low as reasonably achievable:

Source: *"the Commission must adopt a policy of keeping exposures 'as low as reasonably achievable.' (ALARA)"* [Petition at pg. 18].

1.3.2. A RF health and safety program should exist which mitigates any increase in worker risk Source: The Ad-Hoc Association refers to OSHA's finding that it should be a requirement "for a safety program to be in effect to 'mitigate any potential increase in risk,' " and makes related requests for establishing the OSHA RF health and safety program elements. [Petition at pg. 17]

1.3.3. Protections provided by FCC rules, i.e. from body heating, should be stated, and effects (cancer) reported at levels below the FCC hazard threshold should be listed in FCC materials Source: *"Whatever exposure criteria the Commission selects, protection should be stated in [47 CFR]§1.1310 and in informational material, and to include health agency evaluations and observed adverse effects below the hazard threshold upon which adopted criteria are based."* [Petition at pg. 16, 18], and protections stated should be consistent with limitations noted by the federal health agencies [Petition item 14.1 at pg. 10].

1.3.4. No 'grandfathering' of facilities - i.e. all licensed facilities will be subject to the same exposure criteria as apply to any facility newly licensed after the Commission's transition period. Source: The Ad-Hoc Association relies on the Commission rule that *"The exposure limits in §1.1310 are generally applicable to all facilities, operations and transmitters regulated by the Commission."* [CFR §1.1307(b)(1)], and *"Under the Commission's NEPA rules, applicants and licensees are required to submit an environmental assessment if they do not comply with our RF exposure guidelines,"* and noting this required both new applicants and existing licensed facilities to abide by the limits in §1.1310. Also the Ad-Hoc Association has explicitly noted, *"Evidence for more stringent limits already in the record of ET-Docket 93-62 justifies no delay of implementing the Commission's new rules,"* and applies to delays in implementation for new applicants and existing licenses. [Ad-Hoc Association FCC 96-487 at page 6]

1.3.5. Out-of-compliance conditions shall be detected, especially when tall transmitters are close to nearby multi-story buildings resulting in out-of-compliance exposures at upper floor levels, or when due to multiple transmitters located on different properties. [see Petition at pg. 5,6]

1.3.6. Reduce environmental exposures to 40% of present values associated with given internal rates of absorption of RF energy due to recent computer simulation methods found valid by the Commission.[Petition at page 14,15; correction of unintended line given by the Ad-Hoc

Association REPLY to National Broadcasters Association, dated October 18, 1996 at page 4, 5; and developed further by the Ad-Hoc Association comments at pages 8-10, dated October 8, 1996, endorsing and supporting the Cellular Phone Taskforce petition]

1.3.7 Very stringent reductions were requested by the Ad-Hoc Association to set the hazard threshold in terms of SAR to as low as 0.0008 W/kg, and to 'safe' general population protection limits as low as 0.000008 W/kg, which is 1/10,000th of the 0.08 W/kg now considered 'safe' by the Commission [Petition at page 15], and should it be found this request is not yet sufficiently justified, then less stringent reductions were requested. [Petition at page 15,16, and elsewhere].

1.3.8. The weight of evidence is strongest for the Commission to reduce its hazard threshold to be no more than 15% of its current value, i.e. from 4 W/kg to 0.6 to 0.7 W/kg, based upon the accepted RF standard setting criteria of disruption of learned behavior and scientific papers acceptable for standard setting. By applying a safety factor of 100 [Petition at pg. 15,16], a 'safe' limit for the specific absorption rate (SAR) of RF energy was requested of 0.008 W/kg.[Petition at pg. 16, noting item 14.3.5 at pg. 11, and item 19.3 at pg. 16.

1.3.9 A 'flat' power density exposure limit approach was requested by the Ad-Hoc Association [see Petition at item #19.1, 19.2 at pages 15, 16]. This was derived by considering biological and adverse effect at frequencies near 900 MHz, i.e. "So for cellular frequencies the limit would be about 1/10,000th of current limits or 0.05 microwatts per sq. cm., and this power density value was given in item #19.1 as a constant, to pertain to all frequencies.[see Petition at page 15]. Evidence supporting a 'flat' power density, not dependent on frequency, was provided by showing adverse effects at low power density for frequencies with wave lengths ranging from about 10 meters to millimeter length waves [Petition at pages 3, 4, 11, 12, 15, 16; e.g. *"SAR for the brain and eyes increase as frequency increases from 350 MHz to 915 MHz"*, Petition item 19 at pg. 15].

Also, this approach is consistent with National Council for Radiation Protection and Measurements (NCRP)[161] which the Commission said it has followed. The Ad-Hoc Association explicitly requested the Commission adopt the rationale in NCRP Section 17.2 [Petition item #18 at pg. 14] in which it states, *"In those cases in which it has been established that there are highly*

intense, focal concentrations of absorbed RFEM energy in the body (i.e. electromagnetic 'hot spots'), this knowledge should supersede the whole-body value and lead to a corresponding reduction in the permissible level of exposure." [footnote 161 at section 17.2.2.3], and the Ad-Hoc Association noted that localized exposure to the heads of infants was greater than for adults at the cellular and Personal Communication Services frequencies [Petition item #4.1 at page 3]. Adjusting the power density downward at these frequencies above 300 MHz has the effect of keeping power density exposures more near constant than the power densities provided by the Commission.

1.3.10. The Ad-Hoc Association requested the Commission act to assure SAR limit criteria are met limiting partial exposure of the body to localized RF irradiation. From 1.3.9 above, *"SAR for the brain and eyes increase as frequency increases from 350 MHz to 915 MHz"* [Petition item 19 at pg. 15], demonstrates the Ad-Hoc Association concern that localized SAR, such as in the brain or eye not increase as frequency increases.

The Ad-Hoc Association also specifically sited experiments where whole body exposure was low but where localized exposures were relatively much greater to the head and indicating biological effects which would likely be of concern to workers and the population, e.g. loss of REM sleep, sleep disorder treatments relying on localized exposure to the head [Petition at pg. 4, 5, 15, 16].

In addition, the Ad-Hoc Association indicated its concern that partial body SAR protections be met by indicating how the RF standard of the Institute of Electrical and Electronic Engineers IEEE C95.1-1991[83] Section 4.4, Relaxation of Power Density Limits for Partial Body Exposures, may not provide partial body protections sought by IEEE C95.1-1991 as well as by the 1986 RF standard of the 1986 NCRP RF standard[161] [Petition item #14.9 at page 13]. Also, the Ad-Hoc Association explicitly requested the Commission to "explicitly limit energy absorbed" and to follow the rationale in 1986 NCRP section 17.6.1, which addressing limiting local SAR [Petition item #18 at pg. 14 - note that the Ad-Hoc Association was supporting here the principle of local SAR protection, but was not implying that the 8 W/kg exposure in NCRP was sufficiently protective.]. Moreover, the Commission has stated that for types of exposure conditions when

there is an appropriate separation from the transmitter that the Commission's power density limits would apply, but that otherwise its local SAR limits would apply [see FCC 96-326 at para. #64], indicating that for much higher power fixed transmitters, that workers servicing them would also be protected by applying a localized SAR criteria.

1.3.11 Based on providing local SAR protections, the Ad-Hoc Association noted adverse effects at a local SAR of 0.26 W/kg when applicable to the eyes of non-human primates given drugs used for treating glaucoma [Petition item #10 at pg. 11 and footnote 79 therein]. Since the Ad-Hoc Association explicitly requested the Commission adopt the rationale in NCRP Section 17.2 [Petition item #18 at pg. 14] in which it states, *"In those cases in which it has been established that there are highly intense, focal concentrations of absorbed RFEM energy in the body (i.e. electromagnetic 'hot spots'), this knowledge should supersede the whole-body value and lead to a corresponding reduction in the permissible level of exposure."* [footnote 161 at section 17.2.2.3]. This indicates the Ad-Hoc Association justifications for power density limits at Petition at pg. 15,16 include applying a traditional safety factor of 100 to an SAR of about 0.2 W/kg 'threshold', i.e. justifying a 0.002 W/kg 'safe' limit for the eye for both workers and the general population - considerably more stringent than the 8 W/kg allowed for the exposure of the eyes of workers or 1.6 W/kg to the eyes of the general population.

1.3.12 The Commission should re-authorize already approved hand-held phones:

From the above 1.3.1-1.3.11, it is clear that the Ad-Hoc Association has requested in its Petition for the Commission to not approve of 'grandfathering' of any transmitters and which necessarily includes mobile transmitters. This is especially so, since the Ad-Hoc Association noted a study of the U.S. General Accounting Office which raise questions about cellular phone safety [Petition at item #9 pg. 7 footnote 36 therein], and explicitly noted the findings of the Food and Drug Administration ("FDA") in Petition item #14.1 at page 10 and at footnote 50 therein, regarding studies finding excessive exposure from portable phones found 'safe' under past Commission standards. It therefore follows the Petition requests the Commission to re-authorize already approved portable phones. Also, the Ad-Hoc Association explicitly requested, *"Require to re-license any applicants licensed under IEEE 1991."* (i.e. IEEE C95.1-1991) [Petition item #13 at

page 9], and this would include both base station transmitters applicants and applicants to distribute mobile hand-held phones.

1.3.13 The Commission should request the federal health and safety agencies with expertise in RF health and safety to review all of the requests, claims, and evidence submitted by the Ad-Hoc Association and by other parties when these submissions pertain to RF health and safety matters. [Petition item #5 at pages 4, 5]

1.13.14 When in transient passage through public areas, exposure limits for those who are not 'fully in control of their exposure' including the general public and certain workers who are not able to be fully in control of their exposure, should be subject to the more stringent tier of RF exposure, and not to the now 5 fold higher [Petition item 21 at page 16]

1.13.15. Reduce the time period for averaging exposure time to a few seconds as adverse effects have been noted within 10 seconds of exposure. The Ad-Hoc Association provided documentation to the Commission indicating that its 6 minute period for averaging exposure was problematic and should be reduced based upon studies cited by the Ad-Hoc Association. For example, see Petition footnote 13 and letters of M. Swicord and M. Altman referenced therein, and which were included as Exhibit #4 of the Petition].Ad-Hoc in which it is stated, *"The standard still uses 6 minutes for frequencies below 15 GHz. Six minutes was arbitrarily chosen and has no significance in terms of thermal loading to cells or any other biological response."* Also, the Ad-Hoc Association cited studies where there was an almost immediate adverse effect at power densities which, if averaged over 6 minutes would meet Commission rules, e.g. *"perceiving warmth within 10 seconds"* and feeling "very warm to hot" also within a few seconds, and very young animals that would have "muscular fluidity or collapse at levels which if averaged over 6 minutes would be found 'safe' [Petition at page 12].

1.13.16. Notify those which may be affected by a proposed transmitter of its effects and proposed placement before any site lease agreements or other contracts are signed (e.g. notices in advertisements of biological effects observed in cell cultures, animal studies, and electrical interference effects) [Petition at 6,7], and include in educational material reviews of observed associations related to an RF exposure.

1.13.17. Predict exposure based upon worse case conditions of corner reflections and reflections from metal eye glasses (relevant to relatively high exposures of workers) [Petition at page 7,8]

1.13.18. Local jurisdictions may specify list of parties independent from operators and found acceptable to monitor exposure levels [Petition at page 8, 9] and may also require measurements to verify compliance.

1.13.19 The Ad-Hoc Association has requested the Commission clarify that what preemption authority it has over regulating the "placement, construction, and modification" of personal wireless services pertains too environmental effects but not for safety issues, and does not extend to preemption of the regulation of "operation" of such facilities. [Petition item 15 at pg. 13, 14; and comments in opposition to some requests of Ameritech Mobile Communications, Inc. and other comments, dated October 8, 1996 at pages 13-17]. Some may suggest that Congress removed "operation" because it was unnecessary and redundant in 47 U.S.C. 332(c)(7)(B)(iv). If so, then why did the House consistently keep 'operation' in the House version H.R. 1555 ? Also, no doubt telecommunications companies sought to keep this wording in the joint bill - if it made no difference, then why did the Senate conferees resist the House version and resist lobbying efforts to keep 'operation' in? Also, from the plain meaning of the word, regulating the operation of a facility is quite different that regulating its placement, construction or physical modification; certainly one cannot regulate RF exposures to zero, but modest regulation of exposure has been occurring in many states and is clearly different from regulating the placement, construction or physical modification of these facilities.

2. New information

2.1 At 2% of the Commission's hazard threshold of 4 W/kg there were significant increases in ornithine decarboxylase[2] and decreases in from cell interiors in the rate of discharging putrescine, suggesting potential adverse effects. [reported by C. Byus et al in a 1997 reference titled Mobile Communications Safety.[2]] Please note that 2% of 4 W/kg, 0.08 W/kg is equal to the average whole body specific rate of absorption ("SAR") of radio frequency energy that the Commission has selected as 'safe' for the general population[3].

2.1.1 Ornithine decarboxylase:

An enzyme called ornithine decarboxylase ("ODC") is important because, among possible other reasons,

"The biosysthesis of the polyamines has been shown to be a highly regulated process in eukaryotes (all cells with a nucleus) involving primarily the regulation of the rate-limiting enzyme ornithine decarboxylase (ODC) in polyamine biosynthesis."

The regulation of polyamines is important because,

"The biosynthesis of polyamines has been shown to be essential for the normal growth, proliferation, and differentiation of eukaryotes (cells with a nucleus) *and prokaryotes (cells*

without a nucleus) as well..(and that) *If, for example, the synthesis of polyyamines is interrupted or inhibited by selective enzymatic inhibitors of the polyaminie biosynthetic pathways, the growth and differentiation of eukaryotic cells* (cells with a nucleus) *fails to proceed normally..*(and because of) *the potential involvement of polyamines in a number of disease processes including cancer...,"*[2]

Based on their new research in the 1997 Mobile Communications Safety reference, the researchers report,

"For both cultured Chinese Hamster Ovary cells (CHO) and 294T human melanoma cells cultured in monlayer, ODC activity was observed to increase by 50%-80% within the first hour of exposure to the 16 Hz amplitude modulated RF field (of 450 MHz and a resulting average SAR of 0.08 W/kg)[2].

Thus, at the 0.08 W/kg level the Commission has deemed 'safe' for the general population, it has been reported for 2 cell lines, one a human cancer cell, that the activity of this important growth regulating enzyme increased more than 50%.

2.1.2 Putrescine

Putrescine is described as, "A colorless, foul-smelling ptomaine, $NH_2(CH_2)_4NH_2$, produced in decaying animal tissue by decarboxylation of ornithine."[4]

Author's report,

"It has been demonstrated that the polyamines, particularly putrescine, in relatively large amounts, is exported from inside the cell to outside the cell. The relevance of this process to the overall maintenance of polyamines inside the cell cannot be overemphasized[2].

Author's also report on effects after five hours of RF exposure at 450 MHz, 16 Hz amplitude modulation, with an SAR = 0.08 W/kg which is 2% of the 4 W/kg of the Commission's hazard threshold, and equal to the level deemed 'safe' for people by the Commission[3]. It was reported,

"Under these conditions, significant inhibition in the level of putrescine export was observed in the presence of the field in comparison to the sham-exposed cells[2]*,"*

and a decrease of about 50% of the rate of export was observed after 5 hours of field exposure.

Thus, exposure to RF decreases the rate of export from cells of foul-smelling putrescine, produced due to decay in the cell.[2] Authors report, "Other laboratories have also measured alteration in the level of putrescine export in the presence of magnetic field exposure."[2].

2.1.3 Ornithine decarboxylase (ODC) can stimulate nitric oxide production

"In summary, the evidence supports a model of sequential interactions between ELF and ELF-modulated RF fields and certain cellular regulatory mechanisms: ODC activation leads to polyamine synthesis within cells; highly cationic polyamines are exported to polyanionic cell surfaces; at cell surfaces, polyamines regulate the excitability of glutamate receptors; activation of glutamate receptors initiates NO (nitric oxide) synthesis; as a highly diffusible free radical, NO is active in the cell of origin and in adjacent cells [page 112-113[35]]"

2.2 Increase of free radicals at 5% of the Commission's hazard threshold

Melanin containing cells were exposed at a average specific rate of absorption (SAR) of radio frequency energy of 0.2 W/kg and at 2450 MHz, pulsed at 100 pulses per second. Authors report,

"The data indicate that a significant, specific alteration of cell-membrane ordering followed microwave exposure. This alteration was specific to melanotic membranes, as was due, at least in part, to the generation of oxygen radicals (...and...) *Melanin is a ubiquitous polymeric pigment that occurs in membrane-bound organelles or melanosomes of epidermal cells and several cell types in the eye."*[5]

Based on the above, there are grounds to be concerned that exposure may result in an increase of free radicals in skin cells and around which blood cells are located, suggesting a potential increase in skin cancer or leukemias or other cancers of the hemapoietic system.

Therefore it is noteworthy that increases in skin cancer and leukemia were reported in an Australia study of cancers among persons living near TV and FM transmitters[6]. Also, a study of 20 TV or FM transmitters in England found increased leukemia risk associated with living close to these towers.[7,8]. Furthermore, a study of Polish career military personnel over a 15 year period found a statistically significant increase of skin cancer and leukemias; skin cancers occurred 67% more than expected (likelihood due to chance was less than 5%), and cancer of the haematopoietic and lymphatic systems were 631% of expected (likelihood due to chance was less than 0.1%)[9].

Note: This finding of the generation of free radicals at 0.2 W/kg adds support to the making the hazard threshold below 0.2 W/kg. Other effects also reported at this level were disruption of

behavior for rats given dextroamphetmine [Ad Hoc Association FCC 96-326 Petition at pg. 11 item 14.3.6]

2.3 Decreases occurred in indicators of brain energy metabolism at 1/3000 the hazard threshold of the Commission in studies of changes in brain metabolism.[10,11,12"] Changes in ATPase function and energy transfer in the CNS (central nervous system) when the cortex was irradiated at SARs of 0.02 W/kg (for the head) at 200 MHz and at SARs of 0.09 W/kg for the head at 591 MHz. was reported[11]. Because of the importance of charged copper and iron atoms for the process of energy metabolism in the brain, the author's hypothesized that frequencies which could more readily affect these atoms would have a greater effect on brain metabolism. Results supported their hypothesis that some frequencies cause a decrease in brain metabolism, with higher frequency waves of 2450 MHz having least affect, as was speculated. The decreases in brain metabolism occurred in less than 2 minutes of exposure. This can have implications for the Commission's present 6 minute and 30 minute averaging times as will be noted below.

The authors conclude that their studies show that very low level of RF at some frequencies did not increase brain temperature and suggest *"a direct inhibition of metabolic processes by RF radiation."*[11]. The author's performed 4 related studies all consistent, and all showing a decrease in brain metabolism due to low level irradiation from RF under certain conditions.

These studies are of great importance, and provide a biological mechanism for the observations that animals take longer to respond to certain stimuli due to the RF irradiation, and it supports epidemiology studies that found both children and college students in areas with relatively higher RF levels had slower response times. Accordingly, recognizing that slower response times not only indicates an adverse affect on the central nervous system, but also can lead to vehicle traffic accidents - especially to those perhaps who are chronically exposed, such as truck and bus drivers. It can lead to increased job accidents, such as for those who service transmitters.

The Commission's hazard threshold of 4 W/kg pertains to the average SAR for the whole body, and based on this 1/50th, or 0.08 W/kg is set as the 'safe' level for the general population.

However for a part of the body the Commission allows 20 fold higher levels, so that the 'hazard threshold for part body exposures is 80 W/kg with 1/50th of this, or 1.6 W/kg being considered 'safe'. Thus, the 0.02 W/kg is 1/4000th of the Commission's supposed hazard threshold [(20*4 W/kg) / 0.02] and 1/80th of the Commission's 'safe' level for the public (1.6/0.02 = 80).

2.4 Cell membrane receptors involved in activation of free radical nitric oxide are sensitive to radio signals at 1/10th of FCC 'safe' levels.

The following was reported in a review by W.R. Adey (1997)[35]:

(i) Gama-aminobutyric acid (GABA) and glutamate receptors in the rat brain it was reported, *"As a function of field intensity, sensitivities of GABA and glutamate receptors persisted for field intensities as low as 50 microwatts per sq. cm at 16 pulses per second with 915 MHz fields* . For this transmission pattern binding of GABA to GABA receptors decreases upon exposure and binding of glutamate to glutamate receptors increased upon exposure.[page 103[35]].

(ii) *"Activation of glutamate receptors initiates NO (nitric oxide) synthesis; as a highly diffusible free radical, NO is active in the cell of origin and in adjacent cells; and in brain tissue, NO is sensitive as a free radical to ELF magnetic fields in modulation of patterns of EEG rhythms.*[page 112,113[35]].

(iii) *"The pathophysiology of NO links its free radical molecular configuration to oxidative stress, with a role in Alzheimer's and Parkinson's disease and in certain types of epilepsy."* [page 112[35]]

Thus, the exposure activates the glutamate receptors at levels that are about 1/12th Commission 'safe' limits at 915 MHz for the general public (and thus at about 1/600th the hazard threshold which is about 50 times the Commission's general public limits), and such activation has been linked to Alzheimer's disease.

Thus, further justifies the Ad-Hoc Association FCC 96-326 request that the hazard threshold be set below 1/600th of its current level. Moreover, this justifies that exposure to the head should not exceed that level at which the glutamate receptors are stimulated to produce more nitric oxide (NO), plus an appropriate safety factor (which should be as in NCRP 1986 or a greater safety factor).